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HOW TO TEST SEED CORN IN SCHOOL.[a]

There are at least three reasons why teachers, especially in the rural districts, should be interested in seed-corn testing as a school exercise: (1) It furnishes an easy and interesting study in seed germination and plant growth, (2) the extended use of a good method has vast economic value in improving the productiveness of American agriculture, and (3) the teaching of it in the rural school exerts a strong influence toward increasing the confidence of parents in the permanent worth of good school work. The teacher whose work is supported by such a sentiment in the community has her powers of usefulness increased many-fold in comparison with one who is indifferent to the home interests of her pupils and their parents. The teacher who once begins intelligently to try some simple exercises in agricultural nature study will not be long left in doubt as to the responsive interest which she can awaken in any kind of *productive* school work. Children love to *do* things—especially things that are obviously useful; they need only judicious direction in order to turn this instinct into various forms of continuous self-education—which is the only kind that "sticks."

It has come to be true that almost every farmer and rural schoolboy now understands the importance of testing seed corn before planting—and testing it *in the ear* rather than after shelling. But many farmers fail to *do* as well as they *know* in this matter, because they regard many of the methods that have been recommended for testing seed corn as "too much trouble." The plan that is here described is simple enough to be easily followed by any boy or girl in the public schools,[b] and it costs very little.

[a] This circular was prepared in the Agricultural Education Service of this Office by Mr. F. W. Howe, assistant in agricultural education.

[b] So far as can be learned, the essentials of this plan were first developed by Prof. J. A. Jeffery, of the Michigan Agricultural College.

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The only materials needed are a shallow wooden tray, a small handful of carpet tacks, a few yards of wrapping twine, sand enough to fill the tray, and three or four quarts of water. The tray (or several of them) can easily be sawed from an empty soap or cracker box. When finished, it should be about 1½ inches deep inside, 15 inches wide, and 23 inches long; but any of these dimensions may be varied slightly. This tray is divided into small squares by a checkerboard lacing of twine across the top. It is convenient to have these squares about 1½ inches on a side, ten of them in a row across the narrow way of the tray, and fifteen the other way.

Figure 1 shows the general appearance of such a tray and the method of lacing the twine back and forth across the tray and under the tacks. This lacing with the string should not be done until the tray has been loosely filled with dry sand heaped up a little above its top edge. Then the sand should be scraped off with a yard-

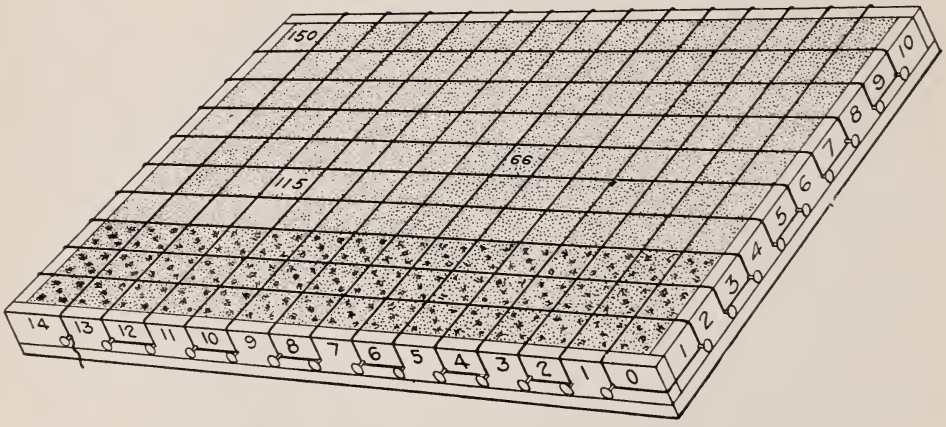

FIG. 1.—A sand tray for testing seed corn.

stick, or other straightedge, even with the top of the tray. After lacing with the string the tray is then ready for planting.

Have the children arrange the ears to be tested in rows of ten, to correspond with the rows of squares across the tray. These rows of ears should be kept in a dry, warm place on the floor, on corn racks, or on shelves, where it can be certain that they will not be disturbed or displaced until the test is finished. A nail is sometimes driven into the shelf or floor at each end of a row of ten ears to keep them in place.

When ready to begin the test, two children can work to the best advantage, one to handle the individual ears and the other to plant the tray. The first takes up ear No. 1 in the first row, and, with the point of a pocketknife applied to the *edge* of a kernel, removes five kernels from each ear, passes them to the second pupil, and carefully replaces the ear in its row. The kernels should be taken in

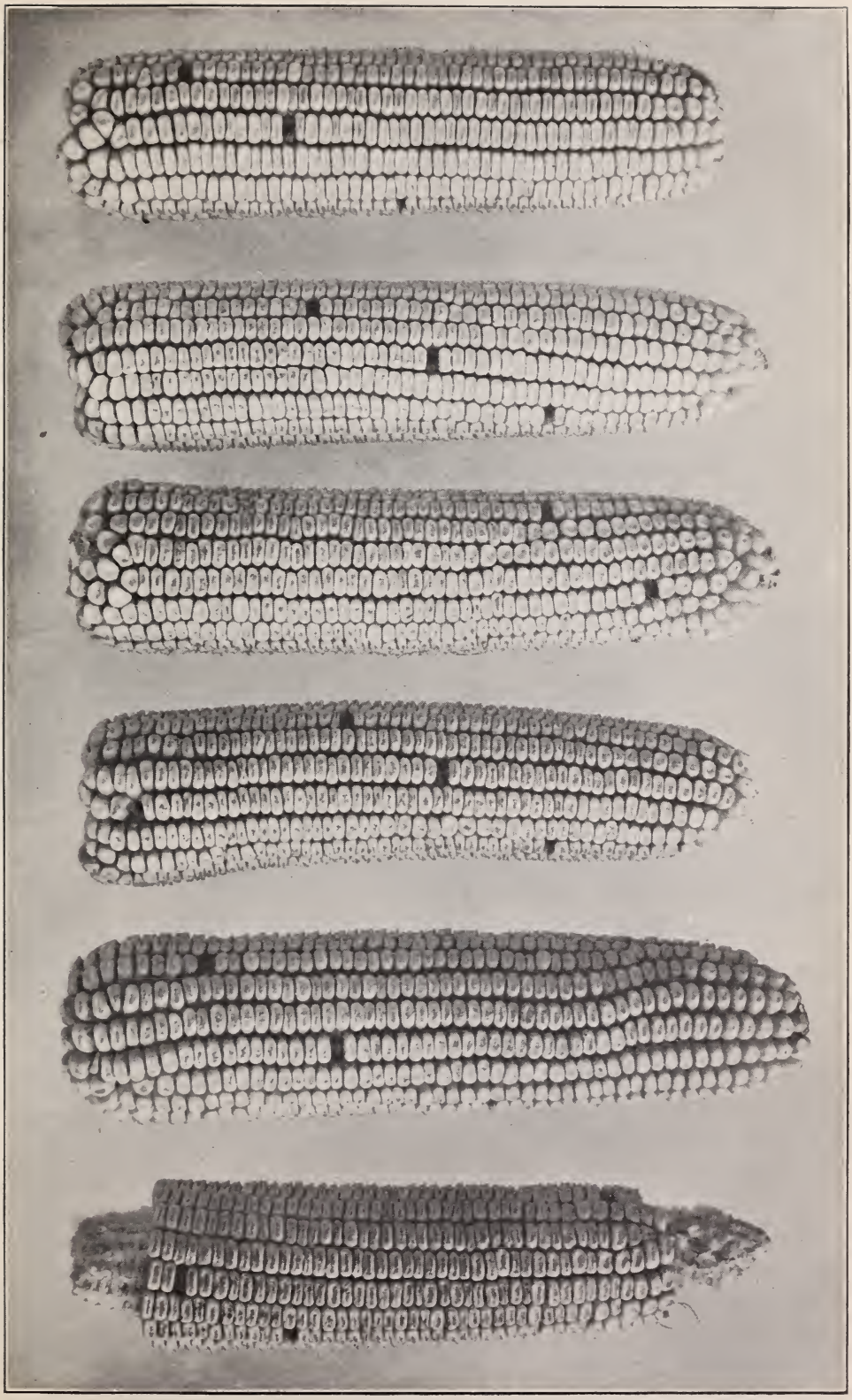

FIG. 2.—Ears of seed corn with kernels removed for testing.

succession (taking only those of average size) from about an inch above the base of the ear to the same distance below its tip, passing spirally *around* and *lengthwise* of the ear. This insures a fair test of the whole ear, as it sometimes happens that one side or one end of an ear is sound while the other will not grow. Figure 2 shows a few ears with kernels removed in this spiral fashion.

The second pupil plants each five kernels in the square which corresponds with the ear from which they were taken. Each of the first four kernels is set in one corner of the square, point downward, and pushed down just far enough to be covered by the dry sand when the forefinger is withdrawn. The fifth kernel is planted in the center of the square, and all should have a uniform depth below the surface of the sand. Figure 1 shows the first three squares planted in each of the fifteen rows.

Two pupils working together can plant at least one square a minute, and much faster with a little practice. But it is important to do the work carefully and treat *all* the kernels *alike*, so that the test may be scientifically exact. This is why dry sand, or some other earth of *uniform* quality and free from foreign substances, is recommended for filling the tray. The same sand should not be used twice unless baked and carefully sifted before the second planting.

When a tray has been planted it must be thoroughly watered and kept in a warm room (perhaps on the warming oven of the kitchen range at home or on a shelf above the schoolroom stove), where it will not be upset or disturbed until the test is finished. The watering is best done by laying a small piece of paper flat on the tray and pouring the water carefully on this until the sand is fully saturated. (There is a *reason* for using the paper.) The planted tray should not be allowed to dry out until the young corn plants are an inch or two above the sand. Sometimes the corn roots are stiff enough to push the kernels up out of the sand. When this happens they should be covered again by sprinkling some damp sand on them.

This method of germinating seed corn has been carefully tested for a long term of years. It is one of the best plans to use in schools because the necessary materials can be easily procured, the germinating seed does not need to be uncovered or disturbed during the test, and the conditions are artificial only to the extent of treating all kernels alike, which is necessary to secure reliable results. Testing in soil is much the most natural method of determining the probabilities of growth in the field.

Figures 3 and 4 show the progressive growth of corn plants in the tray at the end of successive periods. It is best to make the final examination of the plants at some point between the stages shown in these two views, as the latter is a little too far advanced to permit doing the work easily. The plants should be about 2 or 3 inches

high. Begin at square No. 1 and carefully examine each square in regular order through to the last. If you find five good, sturdy plants growing from the five kernels planted in a square, the ear from which they came is all right for planting in the field. It is not necessary to pull these plants up or examine the roots; you can be sure that the roots are all right if the plants are satisfactory.

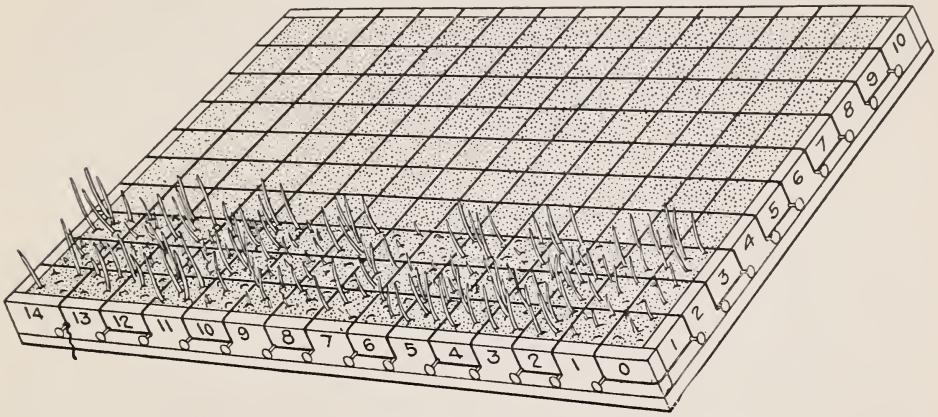

FIG. 3.—Sand tray showing corn seven days after planting.

If there are five plants in the square, but two or more of them are shorter than most of the others in the tray, or look pale and sickly, take at once the ear from which they came out of its row and do not let it get mixed with those that are to be shelled for planting in the field.

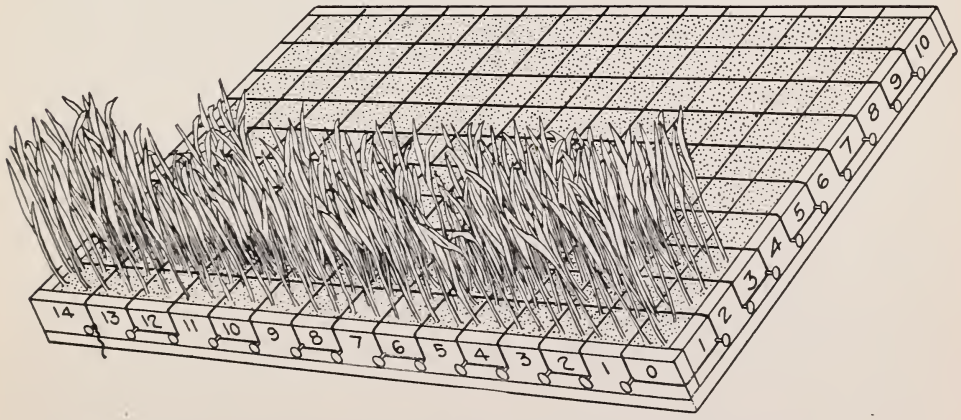

FIG. 4.—Sand tray showing corn twelve days after planting.

If there are four good plants in the square, but the fifth one is smaller or can not be seen at all, dig down carefully until you find whether the kernel germinated. Sometimes the plumule (young stalk) is held at the tip by the tough skin or hull of the kernel until it is bent over and starts to grow horizontally or downward under the

sand. Such a stalk may not yet have its head out in the air when the tray is examined, and so may be pale and weak from lack of breath and sunlight. That would not show any positive fault in the ear from which it came and would not be a sufficient cause for discarding the ear.

If one kernel out of the five has not begun to grow at all, while the rest from the same ear are an inch or two above the sand, it will not be safe to plant that ear. Do not save any ear for seed after the test unless you feel sure that every kernel planted in the field is likely to grow. Every poor ear planted spoils about one-fifteenth part of an acre in the cornfield—and yet some farmers would "blame it on" the crows, or the weather, or something else which they *could not* help; but they *could* be sure of planting seed that they *know* has shown itself able to grow. Occasionally some farmers still make the mistake of first shelling all their seed corn (or buying shelled corn for seed) and then testing a hundred kernels of it. If there is one bad ear in the lot that was shelled, its kernels are then mixed with all the rest, and there is no way to discover or remove them. The *ear* holds them all together until it can be determined whether they will grow.

Until the test is finished, it is *very important* to keep the ears in place, so that the one corresponding to any square in the tray can be picked out at once. If the ears are not laid in rows of ten, they must be numbered in some other way. The number of any square is easily known by referring to the way the tray is numbered in figure 1. Thus square 66 is the *sixth* square in the *row* numbered 6; and the number of any square in the tray is determined by this simple rule: Consider the number marked at the left end of any row as *tens*, and add to this the *unit* number representing the given square (shown in fig. 1 at the right-hand end of the tray). Note whether squares 115 and 150 are correctly numbered according to this rule. If the corresponding ears are arranged in fifteen rows (calling the first row *zero*), the number of any ear can be found in the same way. If this plan is not followed, each ear should be tagged and numbered in consecutive order. Fifteen ears of good size will plant an acre of corn, three kernels to the hill.

(It is a good "practical" and "cultural" problem in arithmetic to figure out the number of hills in an acre—say 3 feet and 8 inches apart—the number of kernels required to plant them, and then count the kernels on an ear of average size grown in your own school district. How many acres can be planted with the seed corn tested in one tray?)

Good care must be taken of the seed corn *after* it is tested, and the testing would better not be done more than two or three weeks before planting in the field. Through lack of care a lot of good seed corn can be spoiled in three weeks—or even three days—by wetting and

molding or by freezing. Before shelling the tested ears it is considered best to remove the small or irregular kernels for upward of an inch from each end of the ear (note the last ear in fig. 2), as these kernels do not usually germinate and grow at the same rate as those in the middle of the ear, and their irregular size also prevents uniform dropping in the planter. All the remaining kernels on the tested ears can then be shelled together, and it is best to mix them thoroughly afterwards, unless you wish to select a few of the best unshelled ears to start a "breeding plat." But that is "another story," told in a number of bulletins published by the Department of Agriculture and the state experiment stations. These will be sent if requested personally. It is a good experiment to try.

The corn-testing method here described can be easily carried out in the ordinary schoolroom if the temperature is not allowed to go below 40° F. If there should be any danger of freezing, the planted tray can be taken to a near-by pupil's home, kept there until the plants are large enough for final examination, and then brought back to the school carefully covered with a blanket that will not crush the young stalks. It is well to have at least one tray tested by the school so that all the children can see and understand the entire process. Then as many as can should be encouraged to test at home the corn which their fathers expect to plant. Where this can not be done at home, some schools have offered to do the testing for farmers; but this requires that the ears to be tested shall be carefully numbered, or arranged in rows of ten, and that five kernels from each shall be brought to the school in little envelopes or packets numbered to correspond with the ears. When the test is finished, the *numbers* of the poor ears must be carefully recorded for reporting back to the farmer from whom the seed came.

It makes a good experiment for the school garden to plant some of the ears which showed poorly in the school's testing tray, and see whether they will do any better under outdoor conditions. In contrast to this, some of the best ears can be planted in a school "breeding plat," as suggested in a preceding paragraph. When the teacher understands how this should be done, the school may become the means of greatly improving the quality and yield of corn throughout the whole district.

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